the way in which it may be changed for making various products.

Figures 22 and 23 are side elevation views of a preferred modification of my invention, Figure 22 being a view of the starting end and Figure 23 being a view of the delivery end of the machine.

Figure 24 is a side elevation view of a presser unit used with a machine shown in Figures 22 and 23.

Figure 25 is an elevation section view taken on line 4—4 of Figure 24.

Figure 26 is an end elevation section view of a device for laying plastic on the belt.

Figure 27 is a vertical section view taken longitudinally through the distributor.

Figure 28 is an elevation view, partly in section of the hopper and lower part of the mixing tank.

Figure 29 is a fragmentary sectional plan view of a portion of the hopper operating mechanism.

A complete machine for the manufacture, by a continuous operation, of products of the class described is made up of the following main parts, viz., a sectional bed plate A supported on a frame of any suitable construction; an endless carrier belt B which travels over the upper surface of the bed plate; a second endless belt C which travels parallel to the carrier belt and is slightly spaced from its upper surface for the major portion of the length of the latter; two sets of cylinders D and E which are supported on the main framework of the machine within the belt C; a mixing plant F; discharge units G which feed material from the mixing plant onto the carrier belt in superposed layers in advance of the belt C, and finally a cutter H at the delivery end of the two belts.

The mixing plant

This plant is designed particularly to produce a number of plastic mixtures of the ingredients which consist principally of cementitious binding and fibrous materials.

By a cementitious binding material, I mean any material having the setting and hardening properties of an hydraulic cement as distinguished from binding materials which do not take a "set". Thus for example, common building lime and plaster of Paris are suitable in addition to hydraulic cement. The materials for the purpose are known and are not part of this invention. The same is true of the fibrous material which may have either a cellulose or vegetable fiber or a mineral fiber, or it may have a combination of the two. A good example of the mixed material is one containing hydraulic cement and asbestos.

The machine may be used to make dry mixtures as well, or a combination of dry and wet mixtures. Separate bodies of mixtures are made so that the composition of some may be different from that of others. Here are shown three mixing units, each unit (Fig. 13) consisting of a hopper 10 which delivers to the bottom of a well 11 within a cylindrical container 12. A spiral conveyor carries the material upward through the well 11 so that it may spill over into the container 12 and be delivered through a converging duct 13 to the mixer 14.

In the mixer 14 is a rotary agitator comprising spaced rotors 15 which have oppositely inclined blades. Between rotors are the fixed baffles 16 formed as arms extending inwardly from the wall of the mixer. The shaft 17 which carries the rotor 15 is hollow and is apertured between rotors as at 18 so that water received from a supply pipe 19 is discharged into the material as it is agitated. At the bottom is a single blade 20 which scrapes the material to an outlet duct 21 which delivers the now plastic mixture to a conveyor 22. The latter, in turn, extrudes the material through a spreader 23 (to be described more particularly hereinafter) onto the belt B.

The conveyors in the wells 11 are driven by worm gear set 24 (see Figs. 1 and 13) from a common shaft 25 which is driven through a variable speed transmission 26 from an electric motor 27.

The shafts 17 of the mixer rotors 15 and the screw conveyors 22 are driven from a single motor 27' through a variable speed transmission 28 so that the operation of the mixers and their conveyors may be in synchronism. A shaft 29 drives a series of short horizontal shafts (not shown) on which are bevel gears 30 which drive the shafts 17. A shaft 31 drives a similar set of horizontal shafts carrying bevel gears 32 for driving the conveyors 22. By this drive the material may be delivered onto the belt continuously in uniform amounts per unit of time.

The hoppers 10 serve as reservoirs to maintain a sufficient supply of dry mixed materials while the conveyors in wells 11 act to regulate the feed of such materials to the mixers. The mixers 14 and the conveyors 22 are so related in capacity that the flow through them will not be interrupted. Change of speed does not vary this relation since both are driven from a common motor. If desired, the dry materials may be pre-mixed and the mixers 14 used principally to cause the water to be distributed uniformly through the mass.

One construction is that in which three mixing units are employed, the middle one having a larger capacity than the others so that the layer which it supplies, (the middle layer of the sheet) may be thicker than the outer layers. This permits the use of less expensive material in the middle layer where appearance is of no importance. A greater amount of ground-up trim or scrap can be used in the middle layer without making the whole product too porous. It will be seen that the several mixtures may differ in composition, color and plasticity. A dry mix may be made in one unit while a wet mix is being made in others, since in pressing the dry layer will take up water from the wet layers. Likewise, a mineral fiber may be used in certain layers and a vegetable fiber in others or one or more layers may contain no cementitious material.

Another alternative is to omit the screw conveyors 22 leaving only an open duct and to make the mix sufficiently wet to give a fluent body of material which can pass by gravity flow to the spreader fans and exude onto the belt B. In such a modified structure, suction boxes beneath the bed plate are used to extract liquid from each layer as it is deposited and also from the full body of the sheet during the initial forming and pressing.

The forming and pressing mechanism

The three spreader units 23 being spaced longitudinally of the belt, the separate mixtures fed by each are deposited in superposed layers or strips which are carried by belt B away from the spreaders and beneath the belt C. The coaction of the belts B and C, together with the bed plate A and rotary cylinder sets D and E gives the forming and pressing which changes the plastic